SM100 Multi-function Calibrator User's Manual

SM100 Series calibrator is a hand -held high accuracy signal source, which adopt battery supply or outside AC/DC power adapter supply.It can be used to output all kinds of industrial signals.

Features:

- DC Voltage : 3 gears (100mV,1V,10V)
- DC Ampere : 2 modes ampere : output: (Source) analog output (Sink)
- Resistance: 2 gears (400Ω, 4000Ω)
- RTD output: Pt100, Pt1000, Cu50 (support 2 , 3 or 4-wires RTD output)
- TC: K , E , J , T , R , B , S , N
- Pulse: Continuous pulse output, counting pulse output, frequency range 2Hz~10kHz
- ON-OFF output: Continuous ON-OFF output , counting ON-OFF output , frequency range: 2Hz~10kHz
- Store normal outputs: It can store and read 64 groups output signals
- Battery power monitoring : Monitor real time battery power and remind present power status.

For your safty, please read following content carefully before you are using our meter !

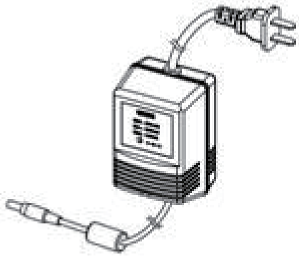
Safety Instructions

- Usage must be in line with User's Manual.
- Checking SM100 before using and please don't use any more if it has been damaged.
- Please make sure the power is off before using.
- Checking test probe and don't touch the metal part of test probe while using.
- Beside of mA sink gear(analog output), please don't apply any voltage to the output terminal, or the meter will be damaged.
- Please don't apply more than 30V voltage among the terminals or between any terminals and ground wire.
- Must use correct socket , mode & gear while outputing different signals.
- Connecting : connect L test probe firstly, then connect H probe with power . Disconnection: disconnect H probe with power, then disconnect L test probe.
- Please use high accuracy output measurement instrument or equipment for calibration under the appropriate humity & temperature enviroment. Please don't use the SM100 near to explosive gase, steam or dust.
- Please use anti-static measures while the humidity is less than 30%.
- Switch off the connection between output probe and external device while switch into another output signal.
- Power must be off before switching signals.
- Must apply SM100 specialized AC/DC power adapter (Model: MPC-DK-9.5V).
- In front of moving device, please switch off power key firstly, then disconnect output probe and device. Please put off the power if you use the SM100 specialized AC/DC power adapter. Finally, pull out the output probe wire.
- Keep charged object away from output terminal, or inner circuit will be damaged.
- Keep chemical substances , rubber , plastic products, searing iron or heating object away from calibrator.
- Must take down the probe from the SM100 before switch the battery. Only AA 1.5V battery meets SM100.

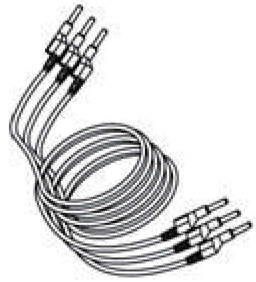
Technical Specification

1. Standard Equipment List

Accessories	Model	Qty
SM100 Instrument	SM100	1
Test Probe Wire (length:1.1m)	Black Red	2
Test Probe Clamps	Black Red	1
Battery	AA (1.5V)	4
User's Manual		1
Quickly Master		1
AC/DC Power Adapter	MPC-DK-9.5V	1
Cold Terminal Sensor		1



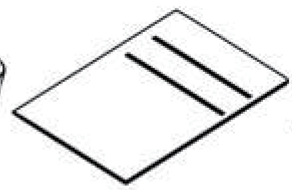
AC/DC Adapter (1pcs)



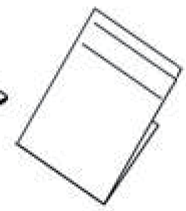
Test Probe (3pcs)

Test Probe Clamps (3pcs)

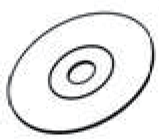
Battery (4pcs)



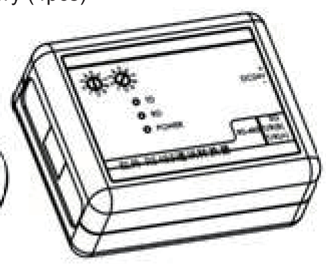
User Manual (1pcs)



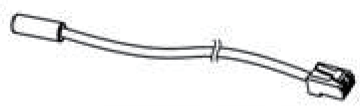
Quickly Master Manual (1pcs)



CD-ROM (1pcs)



Infrared-RS485 (1pcs)
ordered



Cold Terminal Compensator
ordered

***Accessories Pictures

2. Technical Indication

- Power: 4 sections AA (5No., 1.5V) battery & DC power supply : connecting 220V AC via power adapter
- Working Enviroment: temperature 0'C~50'C, humidity ≤80% RH, without frozen
- Storage Enviroment: temperature -25'C-60'C, humidity ≤90% RH, without frozen
- Working Elevation: ≤2000m
- Vibration Shock: randomness 2g, 5~500Hz (measuring less than 1m)
- Calibration Cycle: 1year
- Preheating Time: 15 munites
- Consumption: 4V DC/1kΩ over-load , usage time of 4 sections 1.5V battery lasts about 4hours. 5V DC/1kΩ over-load , usage time of 4 sections 1.5V battery lasts about 21hours.
- Accuracy: following table for Ref. (preheating at least 10 munites before use)

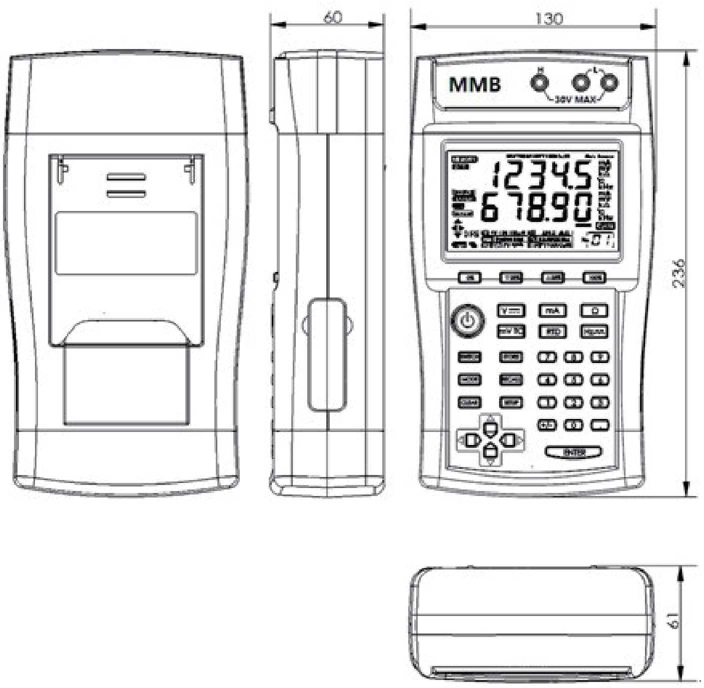
*** Temperature should control at 23±5℃, humidity at 35%~70% RH and preheating more than 20 minutes while calibrate SM100 with high accuracy device.

Function	Range	Setting Range	Resolution	Accuracy	Remark
DC V	100mV	-10.00~110.00mV	10uV	±(0.01%+10 uV)	
	1V	0~1.2000V	0.1mV	±(0.01%+0.1 mV)	Max output current 0.25mA
	10V	0~12.000V	1mV	±(0.01%+2mV)	Max. output current 2.5mA
	resistance output of each voltage output gear ≤0.5Ω, 1V,10V gear capacitive load driving ability≥470uF, 100mV gear capacitive load driving ability≥1uF				
mA Source	20mA	output 0~24.000mA	1uA	±(0.02%+2uA)	Load capacity 19V
mA Sink	-20mA	Analog output 0~-24.000mA	1uA	±(0.02%+2uA)	Auxiliary supply 5~28V

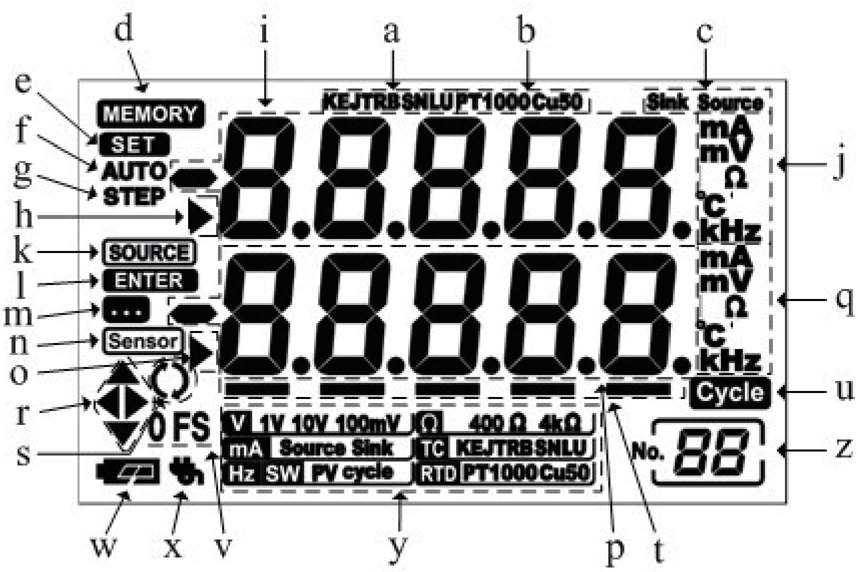
Resistance	400Ω	0~400.00Ω	0.01Ω	±(0.015%+0.1Ω)	0.1~0.5mA exciting current accuracy is without leading resistance (0.1mA exciting applies 0.25Ω Max erro)
				±(0.015%+0.05Ω)	0.5~3mA exciting current accuracy is without leading resistance
	4kΩ	0~4000.0Ω	0.01Ω	±(0.015%+0.3Ω)	0.05~0.3mA exciting current accuracy is without leading resistance (0.05mA exciting applies 0.5Ω Max erro)
Thermal resistance	Pt100	-200℃~850℃	0.1℃	-200~0℃:0.3℃	Pt100, Cu50 is ±1mA exciting current, Pt1000 is ±1mA exciting current (Pt100 0.1mA exciting applies 0.6'C Max erro,Pt1000 0.05mA exciting applies 0.2'C Max. erro), accuracy is without leading wire resistance.
				0~400℃: 0.4℃	
				400~850℃: 0.6℃	
	Pt1000	-200℃~850℃	0.1℃	-200~100℃: 0.2℃	
				100~300℃: 0.4℃	
				300~850℃: 0.6℃	
	Cu50	-50℃~150℃	0.1℃	-50~150℃: 0.5℃	
Thermocouple	R	-40℃~1760℃	1℃	-40~100℃: 1.5℃	Adopt ITS-90 temperature scale, accuracy is not including cold terminal compensation erro.
				100~1760℃: 1.1℃	
	S	-20℃~1760℃	1℃	-20~100℃: 1.5℃	
				100~1760℃: 1.1℃	
	K	-200℃~1370℃	0.1℃	-200~-100℃: 0.6℃	
				-100~400℃: 0.5℃	
				400~1200℃: 0.6℃	
				1200~1370℃: 0.7℃	
	E	-200℃~1000℃	0.1℃	-200~-100℃: 0.5℃	
				-100~600℃: 0.5℃	
				600~1000℃: 0.4℃	
	J	-200℃~1200℃	0.1℃	-200~-100℃: 0.5℃	
				-100~800℃: 0.4℃	
				800~1200℃: 0.6℃	
	T	-200℃~400℃	0.1℃	-200~400℃: 0.4℃	
	N	-200℃~1300℃	0.1℃	-200~-100℃: 0.6℃	
				-100~900℃: 0.5℃	
				900~1300℃: 0.6℃	
	B	400℃~1800℃	1℃	400~600℃: 1.5℃	
				600~800℃: 1.1℃	
				800~1800: 0.7℃	
Consecutive pulse	100Hz	2.0Hz~99.99Hz	0.1Hz	±0.01Hz	square wave is 1-10Vp-p , electrical level is 0V , electrical level accuracy is ±10% , 50% takes empty rate.
	1kHz	100.0Hz~999.9Hz	0.5Hz	±0.5Hz	
	10kHz	1000kHz~10000kHz	100kHz	±10KHz	
				Over load>100KΩ	
Pulse counting modes	100Hz	10~99, 999 cycles	1cyc	±2digit	square wave is 1-10Vp-p , electrical level is 0V , electrical level accuracy is ±10% , 50% takes empty rate.
	1Khz				
	10kHz				
Switch output	100Hz	switch output can be divided into switch output continuously, switch counting output, indication is the same as cousecutive pulse output, pulse counting mode output.			Max. switch voltage current +28V/50mA
	1kHz				
	10kHz				
Auxiliary power	24V			±10%	Max current output 25mA, with cutting-out protection

■ Dimension and Connection Drawing

1. Dimension



2. LCD Display

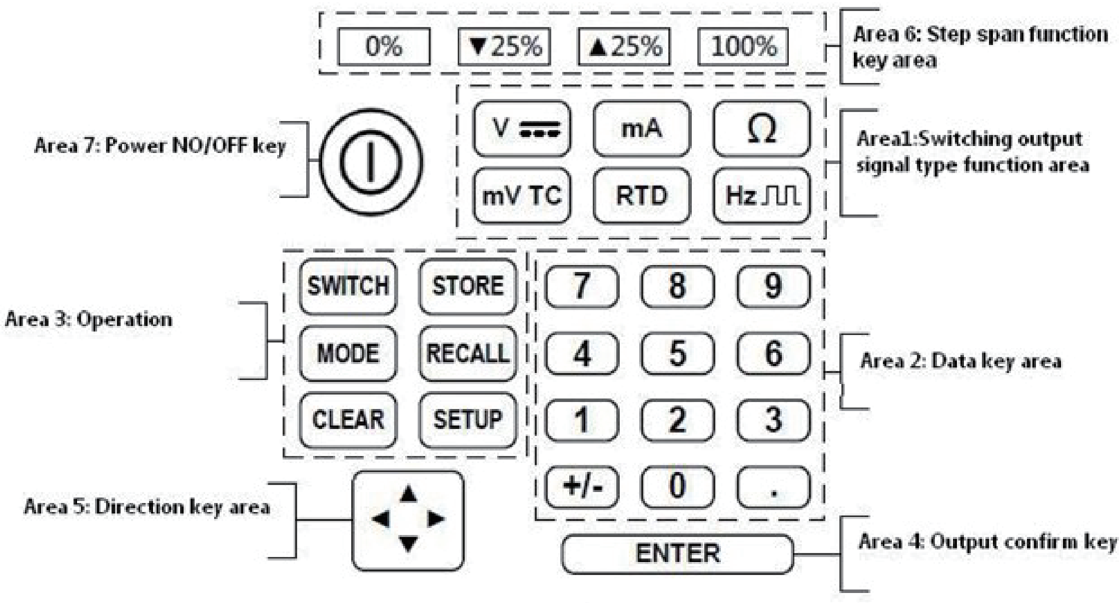


Element indication :

a) last group output TC type
b) last group output RTD type
c) last group output DA type
d) storage/read nomarl output value mark
e) setting status, storaged position mark
f) cold terminal compensation starting mark
g) step span output indication mark
h) parameters modification of upper line indication mark
i) last group output setting value
j) last group output setting value unit
k) output mark
l) setting value output status mark
m) indication mark that setting value is input
n) cold terminal sensor status mark
o) Bottom row parameter modification mark
p) current output setting value
q) current output setting value unit
r) mark that direction key come into effect
s) pulse and DO keys stopping indication
t) amending postion mark that direction key ajust the setting value directly .
u) mark of pulse and DO counting mode
v) mark that output setting value reach high&low limit
w) battery status indication mark
x) indication of power supply way mark
y) current output signal type
z) storage popsition of storage/read normal output value

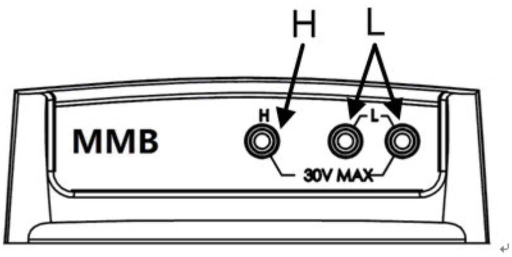
Note: above specification is basis on the normal operation, pls kindly refer to following specification for actual practice

3. Key Illustration

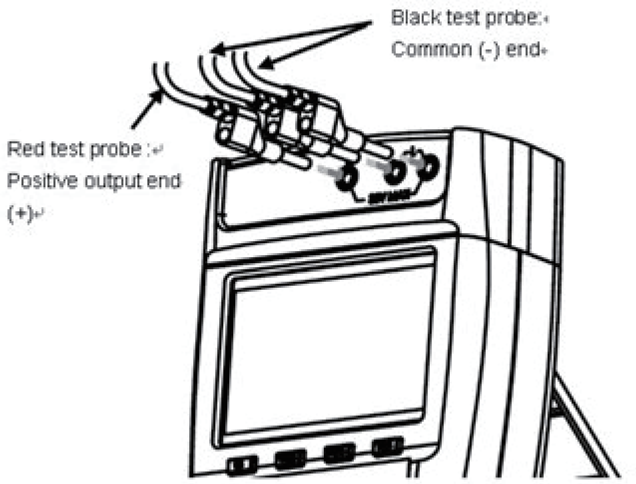


Area	Key	Key Name	Function
1	⏻	Power on/off key	Power on or off
2	V	Output V key	Select DC voltage output , switch range
	mA	Output mA key	Select current output, switch range
	Ω	Output Ω key	Select Ω output , switch range
	mV TC	Output mV/TC	Select DC mV output and TC output
	RTD	Output RTD	Select RTD output function
	Hz	Output Hz key	Select pulse , switch output
3	0 ~ 9	Digit key	Modify output setting value
	•	Decimalpoint key	Input and output value setting decimal point
	+/-	+/- key	Change output setting value positive or negative
4	ENTER	Output confirm key	Output signal confirmation
5	SWITCH	Parameter switch key	Achieve to switch modified value in some of extra function (eg, pulse and switch output , parameter setting etc)
	STORE	Storage key	Storage normal output value and parameter value
	RECALL	Read key	Read normal output value
	MODE	Switch key	Exit setting status is not saved while setting parameters, stop output while output pulse & switch
	CLEAR	Clear key	Clear input parameters to zero
	SETUP	Setup key	Enter parameter setting status
6	▲ ▼	up & down key	Directly adjust ouptut value while analog signal output, adjust storage/read value position while storage/read normal value, adjust the parameter value while setting,
	◄ ►	left & right key	moving modified position while analog signal output, moving parameter amending position while setting parameter.
7	0%	0% output key	Min. output value of output corresponding analog signal
	▼25%	25% reduce key	basis on current signal output value, decrease output 25% according to range
	▲25%	25% increase key	basis on current signal output value, increase output 25% according to range
	100%	100% output key	output Max. value according to analog signal

4. Connection Drawing



H: Output signal: Positive output terminal (+),
L: Output signal: Common (-) terminal (2 terminals)



Picture 4.5, test probe connection drawing

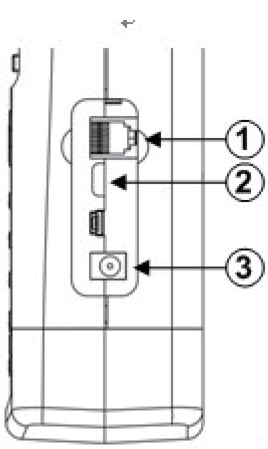
a) Pls take red test probe into H hole slotting and black into L hole slotting.

b) All kinds of output signal corresponding to (+) (-) connection drawing are the same : H:(+), L: (-)

c) Pls make sure output terminal is in line with target device polarity.

Output Signal	Connection Drawing Teminals	
	(+)	(-)
DC voltage	H	Any one of 2 (-) L
DC current	H	Any one of 2 (-) L
DC mA & RTD	H	Any one of 2 (-) L
Ω&RTD (2 wires)	H	Any one of 2 (-) L
Ω&RTD (3 wires)	H	Both 2(-) L
Ω&RTD (4 wires)	Insert superposedly two test probe on H terminal	Both 2(-) L
Pulse signal	H	Any one of 2 (-) L
Switch signal	H	Any one of 2 (-) L

***Other Connector

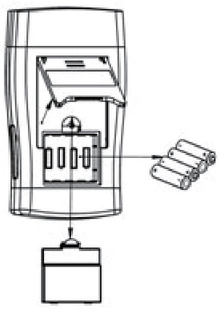


1 cold terminal sensor connector

2 infrared communication connector

3 AC/DC power adapter hole slotting

Battery Mounting & Renewal



Step 1: Firstly , power off and take down the AC/DC power adapter , meantime, disconnect output probe and device . Then take down the probe from SM100 before mounting battery.

Step 2: Hold up the holder on the back of SM100 and open the battery cover as the drawing

Step 3: Mounting battery (4 setion AA 1.5V ,5No.)

Step 4: close the battery cover

Battery and power plug signs at left corner of display window indicates current battery capacity and power supply status:

a) While display window left corner indicates power plug sign , it means SM100 is supplied power by AC/DC power adapter.

b) while display window left corner indicates battery sign , it means SM100 is supplied power by battery. Battery sign is various from battery capacity:

(keep light) : battery capacity is normal

(keep light): battery capacity is lower than 60%

(keep light): battery capacity is lower than 30% but work normally

(flick): battery capacity is very low, pls update the battery

c) AC/DC power adapter is only for supplying power continuously but charging power

d) Once AC/DC power adapter connects to 220V AC power, SM100 will switch automatically into power adapter supplying power

Opteration

1. Power on

Press power key until indicatin light, loosen power key and SM100 is on . Output is 0 gear after power is on.

a) Indication is output signal type,unit& value of last power off default after power is on .

b) if don't hope to indicate any setting value , pls set "LoAd" as "0", then SM100 will only display one row "- - - - -" after power is on .

2. Output signal switching

Realize output signal switching through output signal switching function keys. Following are the subtypes each output signal corresponding.

V — Voltage Type
1. **1V**: 0~1.2000V
2. **10V**: 0~12.000V
3. **24V**: auxiliary power

mA — Current Type
1. **Source** : mA output 0~24.000mA
2. **Sink**: analog output mA Sink 0~24.000mA

Ω — Resistance Type
1. **400Ω**: 0Ω~400.00Ω
2. **4KΩ**: 0Ω~4000.0Ω

mV TC — mV Signal, TC Type
1. **100mV**: -10.00~100.00mV
2. **TC**: K,E,J,T,R,B,S,N

RTD — RTD Type
RTD: PT100,PT1000,Cu50

Hz — Frequency Type
1. **Hz**: pulse output 2.00Hz~10000Hz 3gear accuracy
2. **SW**: switch output 2.00Hz~10000Hz

Signal Type	Initial Output Value	Signal Type	Initial Output Value
400Ω Gear	100Ω	4KΩ Gear	1KΩ
RTD: PT100,Cu50	100Ω Corresponding Temperature Value	RTD: PT1000	1KΩ Corresponding Temperature Value
mA Source Gear (current directly output)	0mA	mA Sink Gear(Analog Output)	0mA
mV Gear	0mV	TC Gear	0mV Corresponding Temperature Value
1V Gear	0V	10V Gear	0V
24V Auxiliary Power Gear	0V		

3. Amending and Output Setting Value (Analog Signal)

A. Indication of normal operation

a) Digitals of last row: last time output signal , Digtals of bottom row: Currently setting&amending signal

b) Step span output indication :

On ENTER status, “STEP” flash through pressing keys 0% ▼25% ▲25% 100% to realize output value increasing & decreasing.

c) Output singal indication:

●●● means setting value is amending.

ENTER Indicating this mark after press output confirm key to realize corresponding setting value signal output.

d) Direction key indication: assist in parts of function, indicate keys’ amending operation .

e) Low limit display “0”, High limit display “FS”.

f) Last time uutput signal type & unit

Last group output signal, unit & value will move to above row if press 0~9 +/- ● CLEAR to modify signal or press switching signal keys to switch signal.

g) Indicate currently setting output signal type & unit.

h) On status of ENTER “__”sign is to indicate currently amending position of up & down key .

B. Keys operation

a) Press following keys to achieve amending & output setting value after switch to required signal .

0~9 +/- ● : Assist to modify present amending value(if amending value is over currently setting signal value H/L limit range , then indicate corresponding H/L limited value.)

CLEAR : Clear currently amending value.

ENTER : Confirm currently input value and output.

b) Indication of modified setting value :

Indication is ENTER, after pressing ENTER to confirm output.

After confirming output by press ENTER, the insufficient bit behind of decimal point will supplement automatically 0 among the range of accuracy.

Example : Press 1.03 through 0~1V gear, then press ENTER to confirm output. indication will change from 1.03 to 1.0300 because 0~1V gear input accuracy is 0.0001.

4. Ajusting output value through step span and direction key

After output signal as setting value , signal value adjustment also can be realized through press step span keys and direction keys ▲ ▼ ◄ ► . Indicated value will reflesh along with increase & decrease of bottom row output value .

a) Step span output:

0% : Output according to present output Min. signal value .

▼25% : According to present signal value, reduce output value by 25% step span of full range. If the value after reducing 25% is lower than Min. value, then directly output on the basis of Min. value.)

▲25% : According to present signal value, increase output value by 25% step span of full range. If the value after increasing 25% is lower than Max. value, then directly output on the basis of Max. value.)

100% : Output according to present output Max. signal value .

b) Direction key assisting to adjust output value:

Moving modified bit via ◄ ► key . “__” mark indicating currently modified bit is under the host digital .

Increase or reduce amending value through key ▲ ▼ .

Example: Assuming present gear mA Source have been outputed 10.000mA, moving amending bit go 10.000 via ◄ ► key.

Current value increase 0.100mA by pressing ▲ key per time, such as :10.100mA,10.200mA,10.300mA...

Current value reduce 0.1mA by pressing ▼ key per time.

Current value reduces 4mA basis on present value by pressing ▼25% per time. (press this key if present value is smaller than 4mA. Current ouput value becames 0.000mA.)

Current value increases 4mA basis on present value by pressing ▲25% per time. (press this key if present value is bigger than 20mA. Current ouput value becames 24.000mA.)

Current value becomes 0.000mA by pressing 0% . Current value becomes 24.000mA by pressing 100% .

5. DC Voltage Output

Step 1 : Switch into DC voltage output function by pressing V⎓ . Pressing this key continuously to realize gear switch among 1V gear, 10Vgear,24V auxiliary power gear. Switch into DC mV output function by pressing mV TC . Default output value after switching signal is 0V.

Step 2 : Input required output voltage value by assitance of key 0~9 +/- • CLEAR . If setting value is more than High/Low limit, indication will change automatically into hgih/low limited value. Indication is ●●● while amending setting value.

Step 3 : Pressing ENTER to confirm ouptut and indication is ENTER .SM100 output voltage signal according to present setting value.

Step 4 : Input new voltage setting value through digital keys and last group setting value will indicate on above row. Output signal will be same as last time setting value.

Step 5 : On signal output status ENTER, pressing 0% ▼25% ▲25% 100% to achieve step span increase&decrease ouput.Pressing ▲ ▼ ◄ ► to realize signal value adjustment directly.

Signal Type	0	▲▼25% Step Span Value	100%
10V Gear	0V	±3V	12V
1V Gear	0V	±0.3V	1.2V
mV Gear	-10mV	±30mV	110mV
24V Auxiliary Power Gear	Auxiliary power function，there is no need to adjust amplitude value.		

6. DC Current Output

Step 1 : Switch into DC current mA output function by pressing mA . Pressing continuously this key to switch between current output gear and analog output gear. Indicating content will have a corresponding indication character. Pls kindly switch into "Source" status.Default output value is 0mA after switching signal.

Step 2 : Input required output current value with assistance of 0~9 +/- • CLEAR .If setting value is more than high/low limit, indication will automatically switch into high/low limited value .Displaying status is ●●● , while setting value.

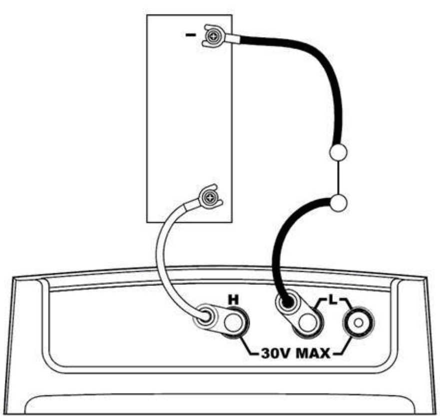
Step 3 : Displaying status is ENTER, after pressing ENTER to confirm ouptut.SM100 output current signal according to present setting value.

Step 4 : Input new current setting value through digital keys, then last group setting value will move & display on above row. Output signal will maintain the size of last time setting value.

Step 5 : On signal output status ENTER, pressing 0% ▼25% ▲25% 100% to achieve step span increase&decrease ouput.Pressing ▲ ▼ ◄ ► to realize signal value adjustment directly.

Signal Type	0	▲▼25% Step Span Value	100%
mA Source Gear & mA Sink Gear	0mA	±4mA	24mA

7.Analog Output (mA Sink)



Step 1 : Switch into analog output (mA Sink) function through mA key. Pressing continuously this key to switch between current output gear and analog output gear. Indicating content will have a corresponding indication character. Pls kindly switch into "Sink" status.Default output value is 0mA after switching signal.

Step 2~6 : Following steps operation is same as DC current output. High/ low gear setting value & step span value of mA Sink gear is same as mA Source gear.

8. Resistance Output

a) Resistance output of SM100 apply for device to adopt exciting current “I” measuring resistance:
While SM100 connects to this kind of device, output terminals of SM100 will engender a corresponding voltage “V=R x I” , then it will have a corresponding equal resistance “R=V/ I” . So SM100 only apply for this kind of device .

b) Exciting current signal “ I ” range which SM100 accepts from target device is 0.1~3mA . Different resistance gear & range is various from exciting current requirement.

c) Output resistance signal of SM100 doesn’t include leading wire resistance. Please kindly use 3wire or 4wire connection drawing for output high accuracy reasistance signal.

d) Ex-factory checking of SM100 is according to 4wire connection drawing.

e) Try to reduce capacity among device terminals , or it will lead resistance output signal estable .

f) Affecting factors of accuracy while output resistance : leading wire resistance, connector resistance , resistance of test probe/test probe clamp/whole loop of device etc.

g) While resistance output is ex-factory setting , exciting current of 400Ω & 4KΩ are 1mA and 0.1mA. When output resistance or RTD, it will result in a steady offset if size of exciting current is different from above specificed current value. The offset is almost constant among the range of full output. If require higher accuracy, setting revised value in the resistance output and clearing the steady offset .

Note: While exciting value changes, revised value have to adjust.

Resistance Connection Drawing	Connecting Terminals	
	Positive output terminal (+)	Common Terminal (-)
2 Wire	H	Any one of 2 L terminals
3 Wire	H	Connecting both of L terminals
4 Wire	Plug via stacking two probes into H terminal	Connecting both of L terminals

Step 1 : Switch into resistance output function by pressing Ω . Pressing continuously this key to switch gears between 400Ω gear and 4KΩ . Indicating content will have a corresponding indication character. Default output value after switching signal: 400Ω gear is 100Ω、4kΩ gear is 1kΩ。

Step 2 : Input the output resistance of necessary by assitance of 0~9 +/- ● CLEAR .If setting value is more than high/low limit, indication will automatically switch into high/low limited value .Displaying status is ●●● , while setting value.

Step 3 : Displaying status is ENTER , after pressing ENTER to confirm ouptut.SM100 resistance output signal according to present setting value.

Step 4 : Input new resistance setting value through digital keys, then last group setting value will move & display on above row. Output signal will maintain the size of last time setting value.

Step 5 : On signal output status ENTER, pressing 0% ▼25% ▲25% 100% to achieve step span increase&decrease ouput.Pressing ▲ ▼ ◄ ► to realize signal value adjustment directly.

Signal Type	0	▲▼25% Step Span Value	100%
400Ω Gear	0Ω	±100Ω	400Ω
4KΩ Gear	0Ω	±1KΩ	4KΩ

9. Analog RTD Output

Step 1 : Switch into RTD output function through RTD , Pressing continuously this key to switch gears among PT100, PT1000, Cu50. Indicating content will have a corresponding indication character. Default output value after switching signal :
PT100 Gear : 100Ω (corresponding 0’C) , PT1000 Gear : 1KΩ (corresponding 0’C) , Cu50 Gear: 100Ω (over limit)

Step 2 : Input the output temperature value(unit:’C) of necessary by assitance of 0~9 +/- ● CLEAR .If setting value is more than high/low limit, indication will automatically switch into high/low limited temperature value .Displaying status is ●●● , while setting value.

Step 3 : Displaying status is ENTER , after pressing ENTER to confirm ouptut.SM100 output RTD signal according to present setting value.

Step 4 : Input new temperature setting value through digital keys, then last group setting value will move & display on above row. Output signal will maintain the size of last time setting value.

Step 5 : On signal output status ENTER, pressing 0% ▼25% ▲25% 100% to achieve step span increase&decrease ouput.Pressing ▲ ▼ ◄ ► to realize signal value adjustment directly.

Signal Type	0	▲▼25% Step Span Value	100%
PT100	-200’C	±250’C	850’C
PT1000	-200’C	±250’C	850’C
Cu50	-50’C	±50’C	150’C

10. Analog TC Output

a) While output analog TC, there’s no cold terminal compensation if without connecting cold terminal sensor.

b) Cold Terminal Sensor Temperature Range : -155~ +125'C . Accuracy is ±0.5 for range of -10~+85'C and accuracy of full range is ±'C.

c) For Analog TC output accuracy , please kindly find TC gear specification for reference. Accuracy don't include cold terminal compensation.

d) Sensor mark Sensor on left corner of screen will be light after cold terminal sensor plugs.

f) After restart,switching signal & gear ,default output status has no cold terminal compensation . Please automatically switch into cold terminal compensation to output through pressing MODE .

g) Automatic cold terminal compensation devide into two kinds of mode : fixed compensation mode and refreshing timely compensation mode.

① Fixed compensation mode :

Pressing analog TC signal output key to output cold terminal temperature value. After confirming output, output value keeps the same while cold terminal temperature value changes.

② Refresh timely compensation mode:

Pressing analog TC signal output key to output cold terminal temperature value. After confirming output, output value is various from cold terminal temperature value.

Noted:
Timely refreshing time of cold terminal temperature value can set.
Cold terminial temperature value real-time refresh come into effect by output analog RTD. Signal will shake while output value changes. So refreshing speed can't set too fast to cooperate with device requrement.

Step 1 : Switch into TC output function through mV TC, Pressing continuously this key to switch TC types among K,E,J,T,R,B,S,N. Indicating content will have a corresponding indication character. Default output value after switching signal is 0mV corresponding temperature value.

Step 2: Default ouptut status don't make cold terminal compensation after switching signal and gear. Please output analog TC through pressing MODE to switch cold terminal compensation mode automatically. Cold terminal compensation status sign " AUTO" on left corner screen will light, wihich shows present output include cold terminal compensation. If without display, that means without cold terminal compensation.

Step 3 : Input the output temperature value of necessary by assitance of 0~9 +/- • CLEAR .If setting value is more than high/low limit, indication will automatically switch into high/low limited value .Displaying status is ••• , while setting value.

Step 4: Displaying status is ENTER, after pressing ENTER to confirm ouptut.SM100 output TC signal according to present setting value.

Step 5 : Input new temperature setting value through digital keys, then last group setting value will move & display on above row. Output signal will maintain the size of last time setting value.

Step 6: Repeat Step 3~4 to output new temperature setting value .

Step 7: On signal output status ENTER pressing 0% ▼25% ▲25% 100% to achieve step span increase&decrease ouput.Pressing ▲ ▼ ◄ ► to realize signal value adjustment directly.

Step 8: On TC output status, pressing SWITCH to switch into indication of present cold terminal sensor measuring value.Meantime, vice-displaying area of above row indicates "Cold " and left corner " Sensor " flashes.

Signal Type	0	▲▼25% Step Span Value	100%
K	-200'C	±400.0'C	1370.0'C
E	-200'C	±300.0'C	1000.0'C
J	-200'C	±350.0'C	1200.0'C
T	-200'C	±150.0'C	400.0'C
R	-40'C	±450'C	176'C
B	400'C	±350'C	1800'C
S	-20'C	±450'C	1760'C
N	-200.0'C	±375.0'C	1300.0'C

11. Frequency Signal Output

Signal Type	Indicating Mark	Subtype
Pulse	Hz	continuous pulse
		pulse counting mode
Switch	SW	switch continuous output
		switch counting output

Step1: Pressing (Hz) to switch into frequency signal output function. Pressing continuously this key to switch between pulse output and switch output. Resolution of pulse & switch signal output frequency are matching automatically. If inputing setting value is more than high&low limited range, amending value will change into corresponding high&low limited value. If intputing setting value is more than limited range of resolution , inputing key will be locked .

Step 2: On frequency signal operation status, press SWITCH to switch the following amending content:

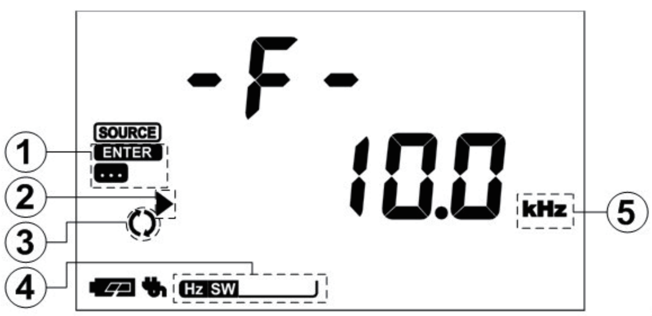
Signal Type	0	Parameters of switching setting		
		Frequency Value	Pulse Value	Numbers of Pulse
Pulse	continuous pulse	√	√	cont*
	pulse counting mode	√	√	√
Switch	switch continuous output	√		cont*
	switch counting output	√		√

* : Numbers of pulse defult setting is continuous mode: indication “ cont” .if output pulse or switch according to counting mode, please set the parameter as pulse numbers/ switch times value of necessary.

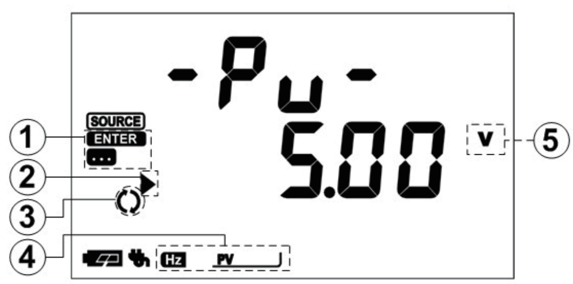
Frequency: “-F-” : 2.00Hz~99.99Hz , 100.0Hz~999.9Hz, 1000Hz~10000Hz

Pulse value “-Pv-” 1.00V~10.00V

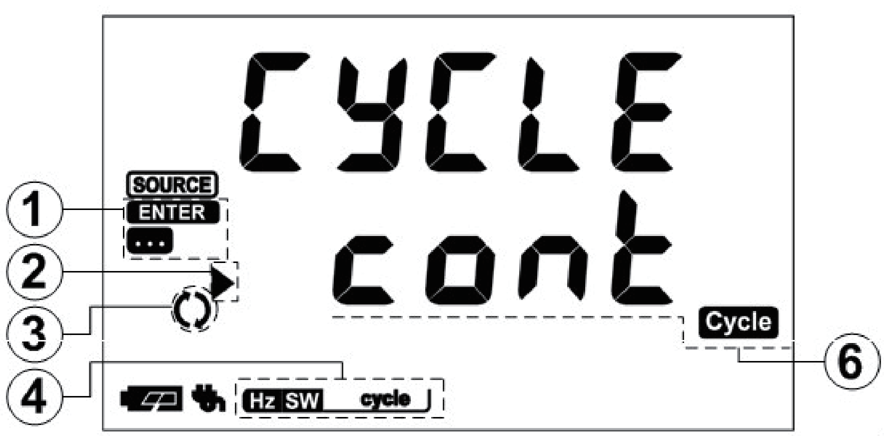
Pulse numbers/switch times “CYCLE” : continuous mode cont (default) or 10~99999 cycle



a) Frequency value amending



b) Pulse value amending



c) Pulse numbers(switch times) amending

① Indicating output signal:

●●● : means amending present setting value.

ENTER : Indicate this mark after pressing output confirm key ENTER to realize corresponding setting value signal output.

② Amending data indicating mark: ► flash as indication.

③ Pressing MODE to stop output, flash several times to indicate.

④ Indicate currently setting frequency output signal type and amending parameters’ unit:

Hz: pulse signal

SW: switch signal

PV: pulse value amending status

cycle: pulse numbers(switch times amending status)

⑤ Currently amending parameter's unit

⑥ When amending pulse numbers/switch times:

" cont" on bottom row means continuous mode; while bottom row indicates digital, Cycle will light. And means counting mode.

Step 3 : Input the output voltage value of necessary by assitance of 0~9 +/- ● CLEAR .If setting value is more than high/low limit, indication will automatically switch into high/low limited value .Displaying status is ●●● , while setting value.

(While amending parameters of pulse numbers/switch times" CYCLE" , press CLEAR to back to "cont" continuous mode.)

Step 4: Displaying status is ENTER, after pressing ENTER to confirm ouptut.SM100 output according to present setting value.

Step 5: Press MODE to stop output.

12. Pulse Output

Character of output pulse signal :

Square wave: take up 50% empty rate, pulse value 1~10V p-p, low electrica level is 0V, electrica level accuracy ±10% . Over load > 100KΩ .

Step 1 : Switch into pulse output function through Hz ЛЛ . The top row indicates "Hz" .

Frequency Range (Hz)	Resolution
2.00~99.99	0.01Hz
100.0~999.9	0.1Hz
1000~10000	10Hz

Step 2 : While above row displays "-F-", input the output frequency value of necessary by assitance of 0~9 +/- ● CLEAR .If setting value is more than high/low limit, indication will automatically switch into high/low limited frequency value .
Frequency resolution matches according to the size of input frequency.If setting value currently input is more than resolution limit, input key will be locked.

Step 3: Pressing SWITCH to switch present amending content into pulse value :-Pv-". Then input the output pulse value of necessary by assitance of 0~9 +/- ● CLEAR . Setting range is 1.00V~10.00V. If setting value is more than the high&low limit, indication will automatically change into high&low limited value. (If pulse value paramter don't amend, default output is 1V.)

Step 4: If hope to output preset number of pulse signal, pls kindly continuous press SWITCH to switch present amending into pulse number "CYCLE".Then input the output pulse number of necessary by assistance of 0~9 CLEAR .Allowed setting value is 10~99999.
(If hope to output continuous pulse, please make sure to set "CYCLE" parameter as "cont".)

Step 5: Press ENTER to confirm output and indication status changes from ●●● to ENTER. Pulse signal output according to present setting pulse frequency vlaue , span value . Or outupt as preset pulse number method.

Step 6: While output pulse, press MODE to stop pulse output and " " flash several times to indicate.

13. Switch Output

Character of Switch Output:
Max. switch voltage current : +28V/50mA

Step 1: Switch into switch ouptut function by pressing Hz ЛЛ .Top row indicates "SW".

Frequency Range (Hz)	Resolution
2.00~99.99	0.01Hz
100.0~999.9	0.1Hz
1000~10000	10Hz

Step 2 : While above row displays "-F-", input the output frequency value of necessary by assitance of 0~9 +/- ● CLEAR .If setting value is more than high/low limit, indication will automatically switch into high/low limited frequency value .
Frequency resolution matches according to the size of input frequency.If setting value currently input is more than resolution limit, input key will be locked.

Step 4: If hope to output preset number of pulse signal, pls kindly continuous press SWITCH to switch present amending into pulse number "CYCLE".Then input the output pulse number of necessary by assistance of 0~9 CLEAR .Allowed setting value is 10~99999.
(If hope to output continuous pulse, please make sure to set "CYCLE" parameter as "cont".)

Step 5: Press ENTER to confirm output and indication status changes from ●●● to ENTER. Pulse signal output according to present setting pulse frequency vlaue , span value . Or outupt as preset pulse number method.

Step 6: While output pulse, press MODE to stop pulse output and " " flash several times to indicate.

14. Storage Normal Output Value

SM100 can save 64 groups of normal output . Low capacity battery or battery updation will not effect on setting value memory. Apart from frequency signal , all of analog signal can save normal output.

a) Memory operating indication

Above row sign : “SAVE” indication mark ,
Bottom row sign: present stored signal setting value

① Present indication:
MEMORY flash, means currently under the memory status.

② Already Saved Indication Sign:
SET flash to indicate if present No. memory position have been saved data.

③ Direction key indication:
Flashing indicates present memory position: No.01 position ▲ flash , No.02~No.63 position ▲▼ , No.64 position ▼ flash.

④ Present saved signal type and unit.

⑤ Memory position:
Position No.:1~64, press ▲ ▼ ◄ ► to switch circularly memory position.

b) Memory key operation:

Full memory process:
(1) On ENTER status, press STORE to switch into momery status indication .

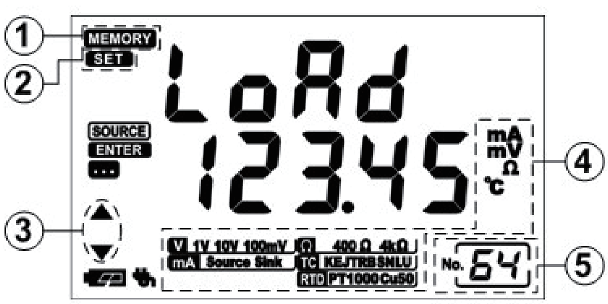
(2) Press ▲ ▼ ◄ ► to switch into present memory position 1~64 , Up&down ±1 pcs position No., left&right ±10 pcs position No.

(3) After slecting well memory position , press STORE until indication back to normal operation status(”SAVE” on above row disapear and flashing content stop to flash).And clear bottom row setting value . Signal type keeps the same.

(4) If don’t want to save in the midway, press MODE to return to normal operation status.

15. Read Normal Output Value

a) Reading operation status



Above row sign : “LoAd” indication mark ,
Bottom row sign: present stored signal setting value

① Present indication:
MEMORY flash, means currently under the “read” status.

② Already Saved Indication Sign:
SET flash to indicate if present No. memory position have been saved data.
(Bottom row of Memory postion which haven’t stored data before indicates “▬▬▬▬▬”)

③ Direction key indication:
Flashing indicates present memory position: No.01 position ▲ flash, No.02~No.63 position ▲▼ , No.64 position ▼ flash.

④ Present saved signal type and unit.

⑤ Memory position:
Position No.:1~64, press ▲ ▼ ◄ ► to switch circularly memory position.

b) Read key operation:

Full memory process:
(1) On the normal operation , press RECALL to switch into read status indication .

(2) Press ▲ ▼ ◄ ► to switch into present read position 1~64 . With switching read position, memory value of selecting saved position No.,signal type and unit info. will timely refresh on bottom row.If no data on present saved position, it will indicate “▬▬▬▬▬”.

(3) After slecting well read position , press ENTER until indication back to normal operation status(”LoAd” on above row disapear and flashing content stop to flash). And directly output the stored data.

(4) If don’t want to read in the midway, press MODE to return to normal operation status.

16. Password Checking

On normal operation status, press SETUP for 2seconds to enter into password checking status:

Above row: parameter indication mark : “oA” means password,
bottom row: password value of awaiting check .

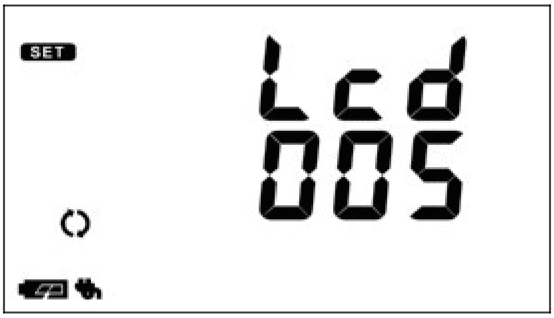
Press CLEAR to enter into password amending status and the corresponding position flash. Move position through key ◄ ► and modify setting value through key ▲ ▼. Press STORE to confirm and it will enter into corresponding parameter group if password correct, or it will return password checking status.

Password value:
8205: enter into parameters setting status
1111: enter into signal checking status
9999: search series ID of machine

17. Parameters Setting

Password is 8205 , pressing STORE to confirm and enter into parameter setting status.

a) Parameter setting status



Above Row: parameter indication mark

Bottom Row: parameter setting value

Following is the parameters which SM100 can set.

Parameter Marks	Parameter Name	Range	Ex-factory value
Lcd*	LCD backlight light up time (second)	0~999	10
LoAd*	if restore output while power on	0: No./1: Yes	1: Yes
bEEP	switch of pressing key sound	0: without./1: have	1: have
rESt*	Automatica shutdown time (minute)	1~999	999
Co-iA*	cold terminal temperature Zero amending value	-99.9~99.9	0
Co-Fi*	cold terminal temperature full range amending value	0.000~2.000	1.000
R1inA*	400Ω gear resistance amending value (Ω)	-9.99~9.99	0.00
R2inA*	4KΩ gear resistance amending value (Ω)	-9.9~9.9	0.0
tCoLd	cold terminal refreshing time (second)	10~9999	10

*Lcd: backlight lighting time unit is second.Setting as 0 and backlight keeps closed. Setting as 999 and backlight keeps lighting.

* LoAd: 0(No): bottom row indicate "-----" after switch on . 1(yes): bottom low indicates outut signal type and value of last time after power on.

* rESt: Automatically shutdown unit is minute. Setting value "999" means switching off automatically.

* Co-iA,Co-Fi: TC cold terminal temperature compensation output by the assiatance of these two parameters, whose usage requires to connect to cold terminal sensor. If don't connect to sensor, parameters are not effective.While ouptut cold terminal compensation, checking accuracy through these two parameters. While checking, pls kindly make zero amendment firstly, then full range amendment.

Effective cold terminal temperature value = cold temperature value of before zero amendment + Co-iA

Effective cold terminal temperature value = cold temperature value of before full range amendment x Co-Fi

* R1inA, R2inA:
While constant excitation of resistance 400Ω gear measures is not equal to 1mA , it will appear to zero float .
R1inA apply for parameter amendment.
While constant excitation of resistance 4KΩ gear measures is not equal to 0.1mA , it will appear to zero float .
R2inA apply for parameter amendment.
While constant excitation of corresponding resistance gear ouput is not equal to above specificed current size,
Setting the average of several float values as the resistance amending value.

* tCoLd: Refreshing time of cold terminal set as 9999, means without making real-time refresh compensation.
While setting as 10~9998, cold terminal temperature compensation refresh timely according to setting value as interval time (second).

b) Keys operation of parameter setting:

On parameters setting status, press SWITCH to switch into parameter menu.

On parameters setting status, press CLEAR to enter into modify status of corresponding parameters. After corresponding position flash, press ◄ ► to move position and press ▲ ▼ to modify the setting value. Lastly press STORE to save.

On parameters setting status, press SETUP for 2 second to back to normal operation.

18. Output Checking

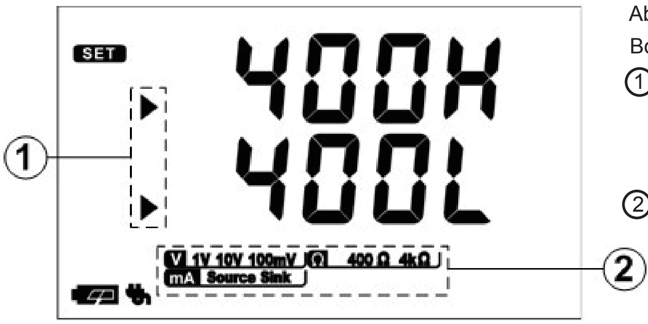
a) Checking enviroment:
temperature enviroment: 23 ± 5'C
relative humidity : 35%~70% RH
Preheating: preheat more than 20 minutes

b) Ex-factory setting value of gear and checking

Signal Type and Gear	Calibration Point				Remark
	Low point 0(L)		High point FS (H)		
	Parameter Mark	Default Value	Parameter Mark	Default Value	
DC voltage 10V	10V-L	0.2V	10V-H	12V	
DC voltage 1V	1V-L	0.1V	1V-H	1.2V	
DC voltage mV	EV-L	1mV	EV-H	110mV	
DC current ouptut mA Source	Sou-L	1mA	Sou-H	9.5mA	High point adopts 9.5mA but not 20mA because of current measuring range of device
Analog ouptut mA Sink	Sin-L	1mA	Sin-H	9.5mA	
Resistance 400Ω	400L	5Ω	400H	400Ω	using 4wire calibration mode for Ex-factory
Resistance 4KΩ	4000L	5Ω	4000H	4KΩ	

While calibrating resistance gear, SM100 shield the parameters R1inA and R2inA of resistance amending value

c) Menu indication of output calibration parameter



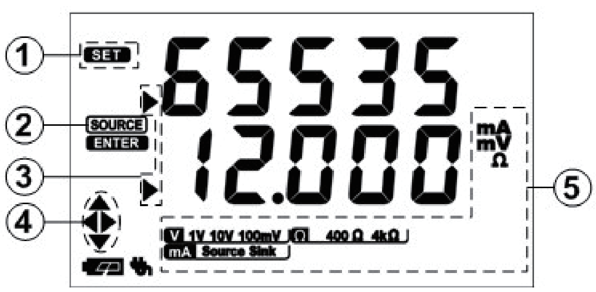
Above Row: High point parameter of necessary calibration

Bottom Row: Low point parameter of necessary calibration

① Indicating mark of amending data :
► indicates present modified position (Above row indicates high point calibration value and bottom row indicates low point calibration value.)

② Signal type of present awaiting calibration

d) Amending indication of Calibrating value



Above Row: high/low point DA code value of necessary calibration (0~65535)

Bottom Row: high/low point corresponding physical value of necessary calibration

① Indicating mark of amendment:
SET flash means currently on the status of calibrating value amendment.

② Indication of ouptut confirming code value:
When pressing output key ENTER , SOURCE light & flash several times after output setting value.Flashing several times means currently setting code vaue have been outputed.

③ Indicating mark of amending data :
► indicates present modified position (Above row indicates high point calibration value and bottom row indicates low point calibration value.)

④ Indicate direction key applying for present amending value.

⑤ present calibrating signal type & unit

Step 1: Pleas kindly find the "Password Checking " description and set the password as 1111. SM100 enters into output checking status after confirm.

Step 2 : press V mVTC mA Ω to switch into calibrating signal type & gear of necessary.

Step 3: on the necessary of calibrating signal type & gear , press SWITCH to switch into corresponding H/L calibration of signal type. Flashing mark ► indicates present amending parameter.

Step 4: press CLEAR to enter into amending status of calibrating value.

Step 5: on amending status of calibrating value , press SWITCH to switch into amendment of DA code value or corresponding phisical value.

Step 6: Firstly, amending bottom row phisical value : amending present calibrating phisical value by the assistance of 0~9 +/- • CLEAR. If setting value is more than H/L limit, indication will switch into high/low limited value. Indication is ••• while modify setting value.

Step 7: Then modify the DA code value : press ◄ ► to move position, press ▲ ▼ to modify the setting value and amending position flashes. Press CLEAR to zero clearing and amending any value among range of 0~65535.

Step 8: Press output confirm key to output DA code value . After output confirm, checking measuring value of high accuracy data meter is in line with phisical value of "Step 6" or not . Repeat "Step 7" and adjust slightly DA code value to make ouptut vlaue close to measuring value.

Step 9: press STORE until indication back to calibrating parameters menu and present calibrating parameter are saved sucessfully.

Step 10: Press MODE to directly exit the amending status of calibration if don't hope to save the calibrating datas. Indication directly back to calibration menu.

Step 11 : On the status of calibrating parameter menu, press SETUP for 2 second to back to normal operation status.

Remarks:

*** Above calibrating signal is not including frequency signal calibration which is no need to calibrate.About the pulse span value, please kindly find the 10V gear calibrating result for Ref.

(1) Selection of calibrating high& low point is according to output signal actual range of necessary. Normally, setting 10% as the low point and 90% as the high point.

(2) While output signal is mV, please choose the 0mV as the calibrating low point, recommending value is 1mV. Please don't choose negative mV value as the calibrating point because of influence of TC effection.

(3) There is no need to individually calibrate the RTD and TC signal. Their accuracy rely on the calibrating accuracy of resistance gear and DC vlotage mV gear.

Signal Type	Signal Type	Calibration Signal of Depending on
RTD	PT100	Resistance gear 400Ω
	PT1000	Resistance gear 4KΩ
	Cu50	Resistance gear 400Ω
TC	K/E/J/T/R/B/S/N	DC voltage mV gear

(4) while ouptut RTD or TC signal, selection of calibrating H/L point is according to the setting temperarture range of each signal permitting.

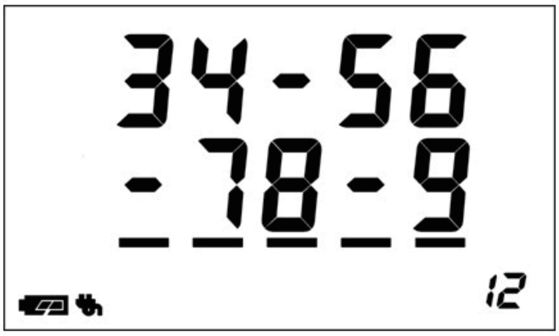
(5) In order to improve output accuracy, calibrating H/L point will try to close to the output range of necessary.

(6) While calibrating the resistance gear, DA code value which close to 0 part output negative resistance value, because resistance output function adopts the principle of electrica compounding resistance.High accuracy data meter can measure out the negative resistance value. Please don't let 0 Ω point appear to negative resistance value or it will result in problem of actual practice.

19. Searching Series ID of SM100 and EX-factory Reset

a) Searching Series ID of SM100

Setting password as 9999 according to " password checking " part. After confirm, it will be able to search machine's series ID of each SM100 corresponding .



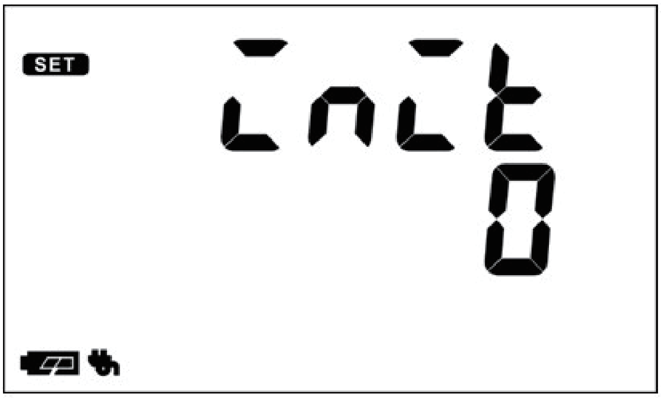
**The photo is the Series ID of a machine :12-34-56-78-9 .

SM100 Series ID function:

It is convenient for buyers to feedback to manufacturer while SM100 have any problems.

b) EX-factory reset:

Setting password as 7310 according to " password checking " part. After confirm, SM100 interface of Ex-factory reset.



Above row : Initialization of indication mark " init "

Bottom row: if restore the ex-factory status : 0: no, 1: yes

Press CLEAR to enter parameters' amendment of ex-factory reset.Data "0" flash and modify the flashing data as "1" through ▲▼ . press STORE to confirm flashing.

Restart the SM100 after switching off. Then the backups parameter will be restored to the main parameter area .

Parameters are restored to the default value and the memory will be cleared.

Calibrator works normally and no need to intervene 7310 parameters.

****Be careful to use the ex-factory reset function.